ALPHA – ONE INTELLIGENT CONTROLLER



USER PROGRAMMABLE (IEC 61131) WIRELESS SAFETY CONTROLLER



The ALPHA-ONE – Intelligent Controller represents a standalone mobile controller platform supporting user authoring application software development based on IEC 61131 (Divelbiss soft-PLC). A SIL-2 capable safety interface guarantees the fulfilment of today's safety requirements. Two CAN communication interfaces are available and support J1939, optiCAN NMEA2000 and proprietary CAN. If required, the ALPHA-ONE – Intelligent Controller platform can be extended with a radio data modem for wireless control using the 2.4 GHz license free ISM band. A twowire tether interface based on RS485 allows for cable remote control. A hardware configurable four-wire RS422 serial interface or an RS232 interface allow for connecting to other systems based on standard serial protocols. A rich set of digital and proportional inputs and outputs make this controller suitable for most mobile control applications in today's market.

SAFETY INTERFACE

INPUT/OUTPUT TYPE	FUNCTIONAL DESCRIPTION	ELECTRICAL SPEZIFICATION
REDUNDANT E-STOP INPUT	Redundant E-STOP input sensing	Each input sinks/sources ~15
	against +U _{Battery} OR GND.	mA.
REDUNDANT E-STOP POWER	Disconnects +U _{Battery} AND GND	Each power switch sinks/sources
OUTPUT	for the safety actuator.	up to 5A.

DATA MODEM

RADIO DATA MODEM TYPE	FREQENCY / CHANNELS	USE CASES
DNT2400	2409.3 MHz – 2467.1 MHz 15 – 37 channels MSK, 1 63 mW Tx power (38.4 kBd 500 kBd data rate)	Point-to-PointPoint-to-MultipointMesh networks
DNT900	902.75 MHz – 927.25 MHz 50 channels MSK, 1 1000 mW Tx power (38.4 kBd 500 kBd data rate)	Point-to-PointPoint-to-MultipointMesh networks

POWER SUPPLY INTERFACE

INPUT TYPE	FUNCTIONAL DESCRIPTION	ELECTRICAL SPEZIFICATION
BATTERY INPUT	836 V and 20 A maximum.	Reverse voltage protected and load dump protected up to 174 V for 350 ms according ISO7637.



COMMUNICATION INTERFACES

INTERFACE TYPE	BUS STANDARD	USE CASE EXPLANATION
CAN BUS INTERFACE #1	CAN 2.0 A & B compliant bus interface. (Termination resistor can be enabled/disabled by software.)	 Proprietary CAN message protocols can be implemented through the Divelbiss programming tool. OptiCAN is supported through the Divelbiss programming tool. J1939 is supported through the Divelbiss programming tool.
CAN BUS INTERFACE #2	CAN 2.0 A & B compliant bus interface. (Termination resistor can be enabled/disabled by software.)	 Proprietary CAN message protocols can be implemented through the Divelbiss programming tool. OptiCAN is supported through the Divelbiss programming tool. J1939 is supported through the Divelbiss programming tool.
TETHER INTERFACE	RS485 half duplex serial interface.	2.4 kBd 500 kBd 1 start Bit 1, 1.5 & 2 stop Bits 58 data Bits
SERIAL COMMUNICATIONS INTERFACE	RS422 full duplex communication link or RS232 full duplex communication link (hardware configurable).	2.4 kBd 500 kBd 1 start Bit 1, 1.5 & 2 stop Bits 58 data Bits



LOCAL INPUTS & OUTPUTS

INTERFACE TYPE	BUS STANDARD USE CASE EXPLANATIO	
PWM CLOSED LOOP CURRENT CONTROL	12 * PWM power outputs with half-bridge driver and current sense capability	Each power output sinks/sources up to 3A. PWM frequency ranges from 100 Hz up to 25 kHz. Protected against reverse polarity, over temperature and short circuit.
DIGITAL POWER OUTPUTS	6 * power ON/OFF outputs	Each power output sinks/sources up to 3A. Protected against reverse polarity, over temperature and short circuit.
ANALOGUE POWER OUTPUTS	2 * analogue power outputs	Each power output sinks/sources up to 250 mA and can drive 010V with 16-bit resolution.
ANALOGUE INPUTS	2 * 420 mA analogue inputs	Each input is protected against over-current through a self healing fuse. The measured result is delivered in 12-bit resolution.
DIGITAL INPUTS	2 * Digital inputs with pulse/frequency counting capability.	Each input is protected against over voltage and can measure frequencies/pulses up to 1 kHz.



MECHANICAL CASE OUTLINE & DIMENSIONS



ALPHA-ONE – Intelligent Controller, Dimensions (151 * 61 * 147)



ALPHA-ONE – Intelligent Controller, Power-Switches & Safety Processor PCB





ALPHA-ONE – Intelligent Controller, Soft-PLC & Radio Data Modem PCB



MOLEX 48 PIN MAIN CONNECTOR

Connector	Connector	Signal	Comment
Group	muex		
		Large Contacts	
	1	V_BATT+	Battery input 0 36V
М	2	V_BATT+	Battery input 0 36V
	3	+LOAD_VBATT	Safety power output battery
	4	GND	Battery ground
	1	V_BATT+	Battery input 0 36V
L	2	OUT_LOAD_GND	Safety power output ground
	3	GND	Battery ground
	4	GND	Battery ground
		Small Contacts	
	1	ESTOP-In-1	Redundant safety inputs
К	2	ESTOP-In-2	
	3	Dig-In-01	Digital inputs / pulse counting
	4	Dig-In-02	
	1	CAN-1-HIGH	CAN bus 1
J	2	CAN-1-LOW	_
	3	CAN-2-HIGH	CAN bus 2
	4	CAN-2-LOW	



1		Ana-In-1	
	1	Ang In 2	Analogue inputs $(0V_{Battery})$
Н	2	Ana-in-2	
	2	+12V	
	3	GND	l ether voltage supply (extra
	4	GND	wires)
	1	V _{Analogue1}	Voltage output (0 Vp)
	1	V _{Analogue2}	voltage output (0 v Ballery)
G	2		
	3	GND	Battery ground
		RS485-HIGH	Tether link positive
	4		
	1	RS422-Tx-HIGH	RS232 / RS422 transmit
	1	RS422-Tx-LOW	
F	2		
	3	GND	Battery ground
		RS485-LOW	Tether link negative
	4		
	1	RS422-Rx-HIGH	DC222 TV DV / DC422 marine
	1	RSZ3Z-1X RSZ32-Ry-LOW	RS232 IA-RA / RS422 receive
Е	2	RS232-RX	
		Dig-Out-01	
	3		
	4	Dig-Out-02	Digital outputs
	_	Dig-Out-03	
	1		
D	2	Dig-Out-04	
	2	Dig-Out-05	
	3		_
	4	Dig-Out-00	
	1	PWM_OUT_CC_01	
	1		
С	2	001_00_02	PWM outputs 1-4
	2	PWM_OUT_CC_03	
	3		
	4		



		PWM_OUT_CC_05	
	1		
		PWM_OUT_CC_06	
В	2		PWM outputs 5-8
		PWM_OUT_CC_07	
	3		
		PWM_OUT_CC_08	
	4		
		PWM_OUT_CC_09	
	1		
		PWM_OUT_CC_10	
Α	2		PWM outputs 9-12
		PWM_OUT_CC_11	
	3		
		PWM_OUT_CC_12	
	4		

ALPHA-ONE – Intelligent Controller, Main Connector Signals



IEC61131 (DIVELBISS SOFT-PLC) PROGRAMMING SYSTEM







The Divelbiss IDE – A Ladder / Function Block Project



18		**** P	ID for PWM CH0 ***	 	
19	₩M_CH0_E	WM_CH0_PI		₽₩M1 ■ EN Q ■	
20	Setpoint_0	SP CO			
21	H0_FB_R		Err_0		
22	Кр_0				
23	Ki_0	—			

The Divelbiss IDE – A Ladder / Function Block Closed Loop Current Control



CAN0 Properties			<u>_</u> 83		>
CAN Port:	CAN0	~			
Bit Rate:	250K	~			
J1939 Device					
O NMEA2000 Device					
Preferred / Fixed Source A	ddress 1	•			
Address Claim					
Arbitrary Address Cap	able Addres	ss Claim Start A	ddress	128	3
	Addres	ss Claim Stop A	ddress	253	3
Industry Group	0				
Vahicla System Instance	0				
Vehicle Ordern	0	(7 ba)			
venicie system	0	 (7 Dic) (7 Dic) 			
Function	0	• (8 bit)			
Function Instance	0	• (5 bit)			
ECU Instance	0	🗧 (3 bit)			
Manufacturer Code	0	🗘 (11 bit)			
Identity Number	(Lower 21 b	its of Chip Seri	al #)		
lser J1939 Database:				Brow	wse
🗹 Us	se Standard J1	939 Database			lu
				E	את
				Create	New
OK		Car	cal		

The Divelbiss IDE – J1939 / NMEA2000 Configurator



🚽 J1939 Properties		<u>100</u>	
Universal Settings			Advanced
Enable Address C	laim		
Interfaces			
Name			Add
CAN0			Properties
			Remove
	0/	and	
	UN	icei	

The Divelbiss IDE – CAN Manager

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